

REMARKS

Entry of the foregoing, reexamination and reconsideration of the subject matter identified in caption, as amended, in light of the remarks which follow, are respectfully requested.

Claims 1-11 and 14-22 are pending in the application. Of these, claims 1-11 and 14-21 have been allowed and claim 22 rejected. Applicant notes with appreciation the indication of allowable subject matter.

By the foregoing amendments, claim 22 has been revised to specify that “the vertical taper is effective for coupling between waveguides having different mode sizes at opposite ends of the waveguide”. Support can be found, for example, in section [0015] of the subject Specification with Figure 3.

Claim 22 stands rejected under 35 U.S.C. §102(e)¹ as being anticipated by Japanese Patent Publication No. 06-338653 (Tetsuro). This rejection is respectfully traversed for the following reasons.

Claim 22, as amended above, sets forth an optical device. The optical device comprises: a waveguide comprising an upper surface and a lower surface, the upper surface comprising a taper surface that provides a vertical taper to the waveguide, wherein the vertical taper is effective for coupling between waveguides having different mode sizes at opposite ends of the waveguide; and a diffraction grating disposed on the taper surface. The waveguide and the diffraction grating are made from a monolithic optical material. The monolithic optical material is over a substrate common to both the waveguide and the diffraction grating. The substrate is disposed adjacent to the lower surface of the waveguide.

Tetsuro discloses a semiconductor laser which improves the uniformity of a field strength distribution in the interior of the resonator. Diffraction gratings are provided at an angle of roughly 45° to the axes of optical waveguides and at an angle of roughly 45° to the end face of the resonator, interposing the optical waveguides between them. With reference to Figure 3, an N-type InP buffer layer 11 is formed on an N-type InP substrate 10. A DBR layer 12 is formed from alternating N-type InGaAsP and N-type InP layers.

¹ The applied Japanese Patent Publication No. 06-338653 does not qualify as prior art under 35 U.S.C. §102(e). Sections 102(a) and (b) appear to be relevant in this regard.

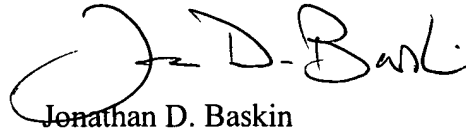
An InGaAsP active layer 13, a P-type DBR layer 14 and a P-type InGaAs cap layer 15 are grown. Then, a photoresist 16 is applied and surfaces 17 at an angle of 45° to the end face of a resonator are formed by exposure, developing and etching. A photoresist 18 is applied, exposed and developed in such a way that it is left only on those portions of the surface at an angle of 45°. A P side electrode 19 and an N side electrode 20 are deposited. Then, portions deposited on the 45° surfaces of the electrode 19 are removed by a lift-off method, and diffraction gratings 22 are formed using a photoresist 21. (See English Abstract).

Tetsuro does not disclose or suggest each feature of the applicant's invention as presently claimed. For example, Tetsuro does not disclose or fairly suggest an optical device which includes a waveguide having a taper surface that provides a vertical taper to the waveguide, wherein the vertical taper is effective for coupling between waveguides having different mode sizes at opposite ends of the waveguide, as recited in claim 22. The Tetsuro waveguide is part of a semiconductor laser. In this device, light is generated internally and is reflected 45° by the diffraction gratings to exit the waveguide end face as shown by the arrow on the right side of Figures 1 and 4-6. The waveguide in accordance with the invention, on the other hand, is effective for coupling light into and out of the waveguide at opposite ends thereof. The claimed waveguide is effective for coupling light between waveguides having different mode sizes at opposite ends of the waveguide. The waveguide may, for example, be used for coupling light between an integrated optical waveguide on one end of the waveguide to an optical fiber at the other end of the waveguide. Tetsuro is not at all suggestive of such a structure as that document is directed to a semiconductor laser and not to a waveguide for coupling at opposite ends thereof between optical waveguides having different mode sizes. Accordingly, withdrawal of the §102(a) rejection is respectfully requested.

From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order, and such action is earnestly solicited.

If there are any questions concerning this paper or the application in general, the Examiner is invited to telephone the undersigned at his earliest convenience.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "J. D. Baskin". The signature is fluid and cursive, with the first name "Jonathan" and last name "Baskin" clearly legible.

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Date: August 1, 2006